

(19) World Intellectual Property
Organization
International Bureau



INTERNATIONAL PATENT COOPERATION TREATY (PCT)

(43) International Publication Date
21 July 2005 (21.07.2005)

PCT

(10) International Publication Number
WO 2005/065325 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/US2004/043751

(22) International Filing Date:
22 December 2004 (22.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/532,840 24 December 2003 (24.12.2003) US

(71) Applicant (for all designated States except US): GELcore LLC [US/US]; 6180 Halle Drive, Valley View, OH 44125-4635 (US).

(72) Inventors: ELIASHEVICH, Ivan; 514 Prospect Street, Maplewood, NJ 07040 (US). VENUGOPALAN, Hari, S.; 575 Easton Avenue, #10H, Somerset, NJ 08873 (US). GOA, Xiang; 78 College Drive, Edison, NJ 08817 (US). SACKRISON, Michael, J.; 1456 Westgate Drive, Bethlehem, PA 18017 (US).

(74) Agent: McCOLLISTER, Scott, A.; Fay, Sharpe, Fagan, Minnich & McKee, LLP, 1100 Superior Avenue, Seventh Floor, Cleveland, OH 44114-2579 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

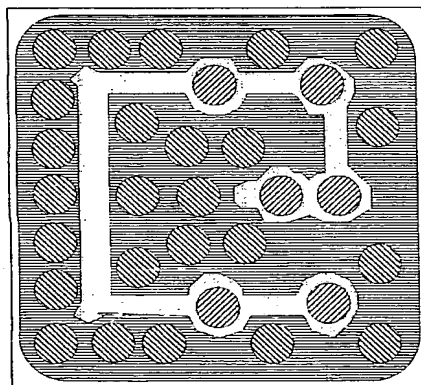
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: OPTIMIZED CONTACT DESIGN FOR THERMOSONIC BONDING OF FLIP-CHIP DEVICES



- A KEY
- B n-type bump area (320n)
 - C p-type bump area (320p)
 - D n-type trace corresponding to n-type contact (180n)
 - E p-type trace corresponding to p-type contact (180p)

(57) Abstract: A light emitting device (A) includes a semiconductor die (100). The semiconductor die includes: an epitaxial structure (120) arranged on a substrate (160), the epitaxial structure forming an active light generating region (140) between a first layer (120n) on a first side of the active region and having a first conductivity type, and a second layer (120p) on a second side of the active region and having a second conductivity type, the second side of the active region being opposite the first side of the active region and the second conductivity type being different than the first conductivity type; a first contact (180n) in operative electrical communication with the active region via the first layer in the epitaxial structure, the first contact being arranged on a side of the epitaxial structure opposite the substrate; a second contact (180p) in operative electrical communication with the active region via the second layer in the epitaxial structure, the second contact being arranged on a side of the epitaxial structure opposite the substrate; a first contact trace corresponding to the first contact and defined at a surface thereof distal from the substrate, the first trace including at least one area designated for bonding (320n); and, a second contact trace corresponding to the second contact and defined at a surface thereof distal from the substrate, the second trace including at least one area (320p) designated for bonding. Suitably, the first contact trace is substantially enclosed within the second contact trace.



WO 2005/065325 A2



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.